

CLAIMS

1. An electrode system intended for an electrochemical cell, comprising a substrate (20) and, associated with it, close together, on the one hand, a measurement electrode formed from a plurality of electrically conducting microdisks (23, 24) connected together and, on the other hand, a generator electrode formed from an electrically conducting plate (30, 32) pierced by circular apertures (31) larger in diameter than the microdisks and placed so that each aperture is concentric with a microdisk, characterized in that:

- the substrate (20) is made of an electrically conducting material and is pierced on its upper face, by a regular array of cavities (22); and

- the microdisks (23, 24) forming the measurement electrode are contained within said cavities.

2. The electrode system as claimed in claim 1, characterized in that it includes an electrically insulating layer (25) deposited on the substrate (20) and pierced by a plurality of circular apertures (26) that are centered on the cavities (22) and have a smaller diameter than said cavities.

3. The electrode system as claimed in claim 2, characterized in that the microdisks comprise a thin metallization (23), which is deposited on the bottom of each cavity (22) and has substantially the same diameter as the apertures (26) of the insulating layer (25), and, optionally, a thick metallization (24) at least partly filling the rest of the cavity.

4. The electrode system as claimed in claim 3, characterized in that the thin metallization (23) comprises a multilayer formed from an adhesion layer (23a) and a conducting layer (23b).

5. The electrode system as claimed in claim 4, characterized in that the adhesion layer (23a) is made of titanium and the conducting layer (23b) is made of platinum.

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6. The electrode system as claimed in one of claims 3 to 5, characterized in that the thick metallization (24) is formed from the desired electrode material.

10 7. The electrode system as claimed in claim 6, characterized in that the thick metallization (24) is made of an electroplatable material, such as gold, platinum, copper, etc.

15 8. The electrode system as claimed in one of claims 3 to 7, characterized in that the thick metallization (24) is flush with the upper face of the substrate (20).

20 9. The electrode system as claimed in one of claims 3 to 7, characterized in that the thick metallization (24) is covered with an active layer flush with the upper surface of the substrate (20).

25 10. The electrode system as claimed in one of claims 1 to 9, characterized in that the generator electrode (30) is made of conducting diamond.

11. The electrode system as claimed in one of claims 1 to 9, characterized in that the generator electrode (32) has a thickness allowing it to constitute, around and above the microelectrodes (23, 24), a confinement volume protected from the hydrodynamic flow of the solution to be treated.

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12. The electrode system as claimed in one of claims 1 to 11, characterized in that the substrate (20) is made of silicon rendered conducting by doping.

13. A process for producing the measurement electrode of an electrode system as claimed in one of claims 3 to 12, characterized in that it comprises the following operations in succession:

- 5 - a conducting substrate (20) is provided;
- the insulating layer (25) is deposited on its upper face;
- a mask (27) provided with an array of circular apertures (28) is formed on said insulating layer (25),
- 10 the arrangement and the diameter of which apertures correspond to the array of microdisks (23, 24) to be produced;
- the insulating layer (25) is etched through the mask (27) so as to obtain said circular apertures (26);
- 15 - the substrate (20) is deeply etched through these apertures (26) so as to obtain said cavities (22);
- said thin metallizations (23) are deposited on the bottom of each cavity (22); and
- 20 - said thick metallizations (24) are deposited on the thin metallizations (23).

14. The process as claimed in claim 13, characterized in that the insulating layer (25) and the substrate
25 (20) are etched by plasma etching.

15. The process as claimed in either of claims 13 and 14, characterized in that the thin metallizations (23) are deposited by vacuum evaporation.

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16. The process as claimed in one of claims 13 to 15, characterized in that the thick metallizations (24) are deposited by galvanic growth.